

Power Controller

In alternating current (ac) induction motors, a substantial percentage of the power consumed may be wasted. The wastage is caused by the fact that power companies supply a fixed voltage to electric motors, based on what the motors need to handle the heaviest loads they are designed to carry. But the ac motor does not normally operate under full-load conditions, so a good part of the time it does not need the voltage supplied. Even when it is idling, it is still getting the fixed voltage; this creates high current flow and resulting heat loss just as if the motor were working hard.

A device to curb this wastage was developed by Marshall Space Flight Center (MSFC) engineer Frank Nola in the course of NASA's Solar Heating and Cooling Program, managed by MSFC. Called the Power Factor Controller (PFC), the device offers exceptional energy conservation potential by virtue of its ability to sense shifts in the relationship between voltage and current flow and to match them with the motor's need. When the PFC senses a light load, it cuts the voltage level to the minimum needed, which in turn reduces current flow

and heat loss. Laboratory tests showed that the PFC could reduce power used by six to eight percent under normal motor loads and as much as 65 percent when the motor was idling.

More than 150 companies have sought and have been granted NASA licenses for commercial use of the PFC technology; some 30 companies are actively producing modified versions of the PFC. The accompanying photos illustrate one such system, the Vectrol Energy Saver (VES), produced by Vectrol Inc., Oldsmar, Florida, a subsidiary of Westinghouse Electric Corporation. The VES is produced in a series of models for electric motors ranging in capacity from five to 700 horsepower. In the photo at left is a VES used to control escalators at a Woodward & Lothrop department store in Wheaton, Maryland (below right). Woodward & Lothrop, which operates 14 stores with about 70 escalators, is interested in the energy savings possible through matching voltage with escalator load, which varies widely during a day. Ordinarily, the escalators draw power for maximum load; with the VES installed, energy use is regulated according to how many people are on the escalator at any time. Woodward & Lothrop estimates that the energy savings for the Wheaton test installation are 30 to 40 percent.

